

# MÄGERLE MFP30 Dressing Roll Hoist

GE Aerospace

## PROBLEM STATEMENT

Create a functioning hoist prototype to remove the dressing roll from the machine. The hoist should increase safety and reduce the time taken to remove the dressing roll.



Figure 1.0. Dressing roll



Figure 1.1. MÄGERLE MFP30

## REQUIREMENTS

#	Requirement Description
1	The hoist must lift and hold a minimum weight of 85 lbs.
2	The design must have a minimum factor of safety of 1.5.
3	The product must be mobile and be able to access multiple machines.
4	The product must be operable by a singular person.
5	Limited swinging movement during removal, installation, and transportation.
6	Design must not involve hydraulic components

## FINITE ELEMENT ANALYSIS (FEA)

Figure 2.0 and Figure 2.1 show FEA of Final Design. Completed using Altair Inspire. Resulted in a minimum factor of safety of 5.0 and minimal deformation.

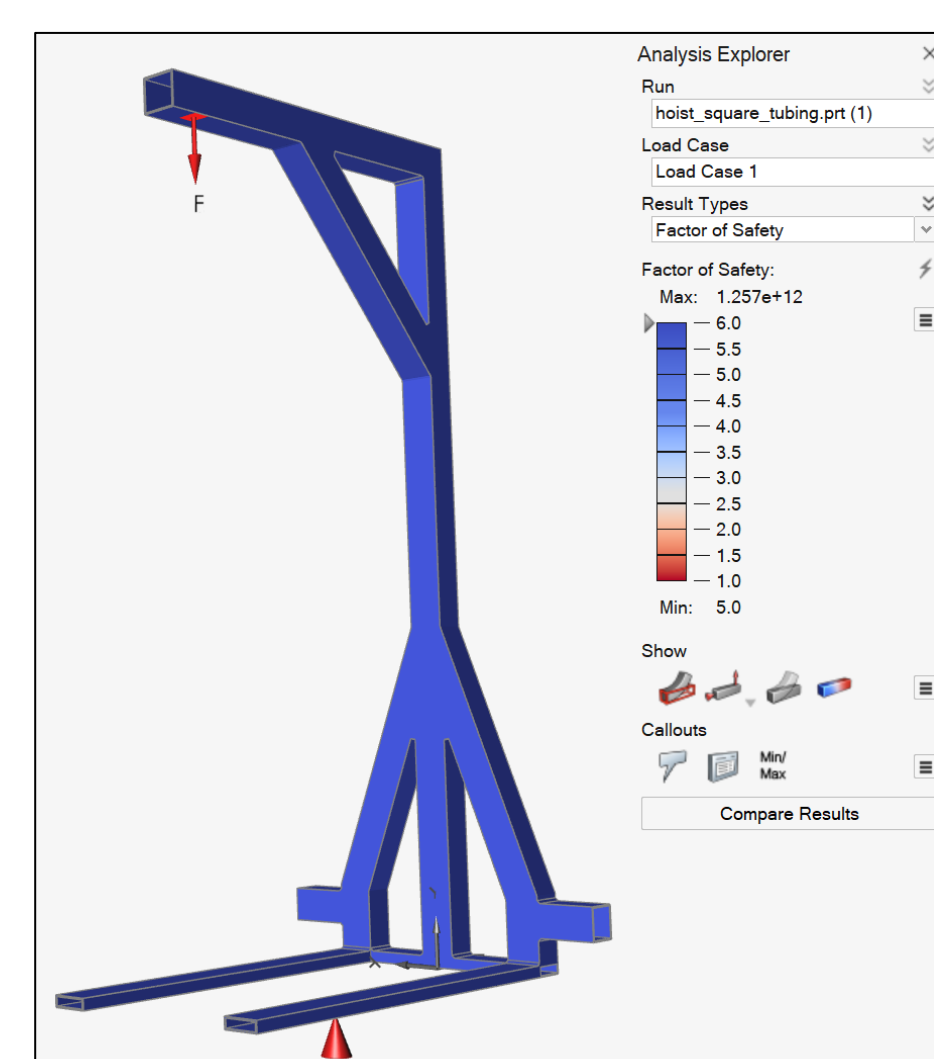


Figure 2.0. Factor of Safety

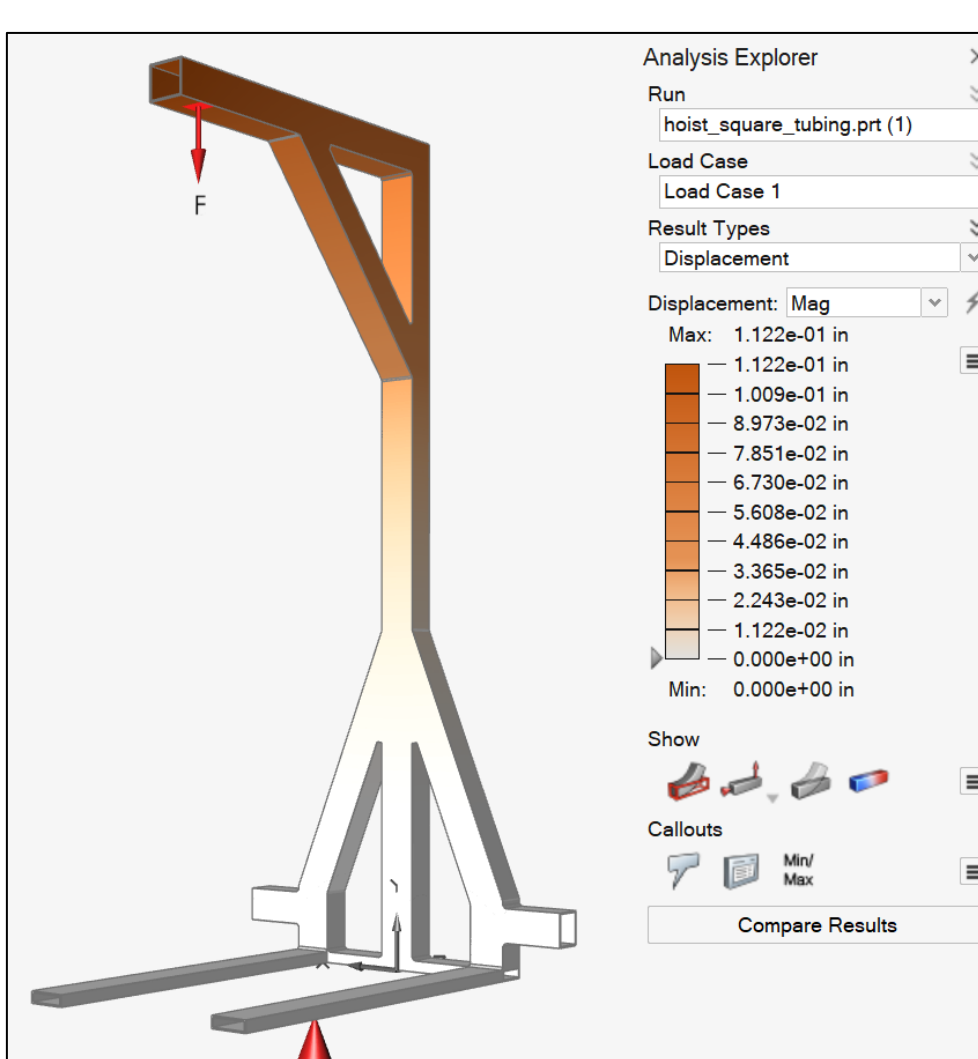


Figure 2.1. Deformation

## FINAL DESIGN

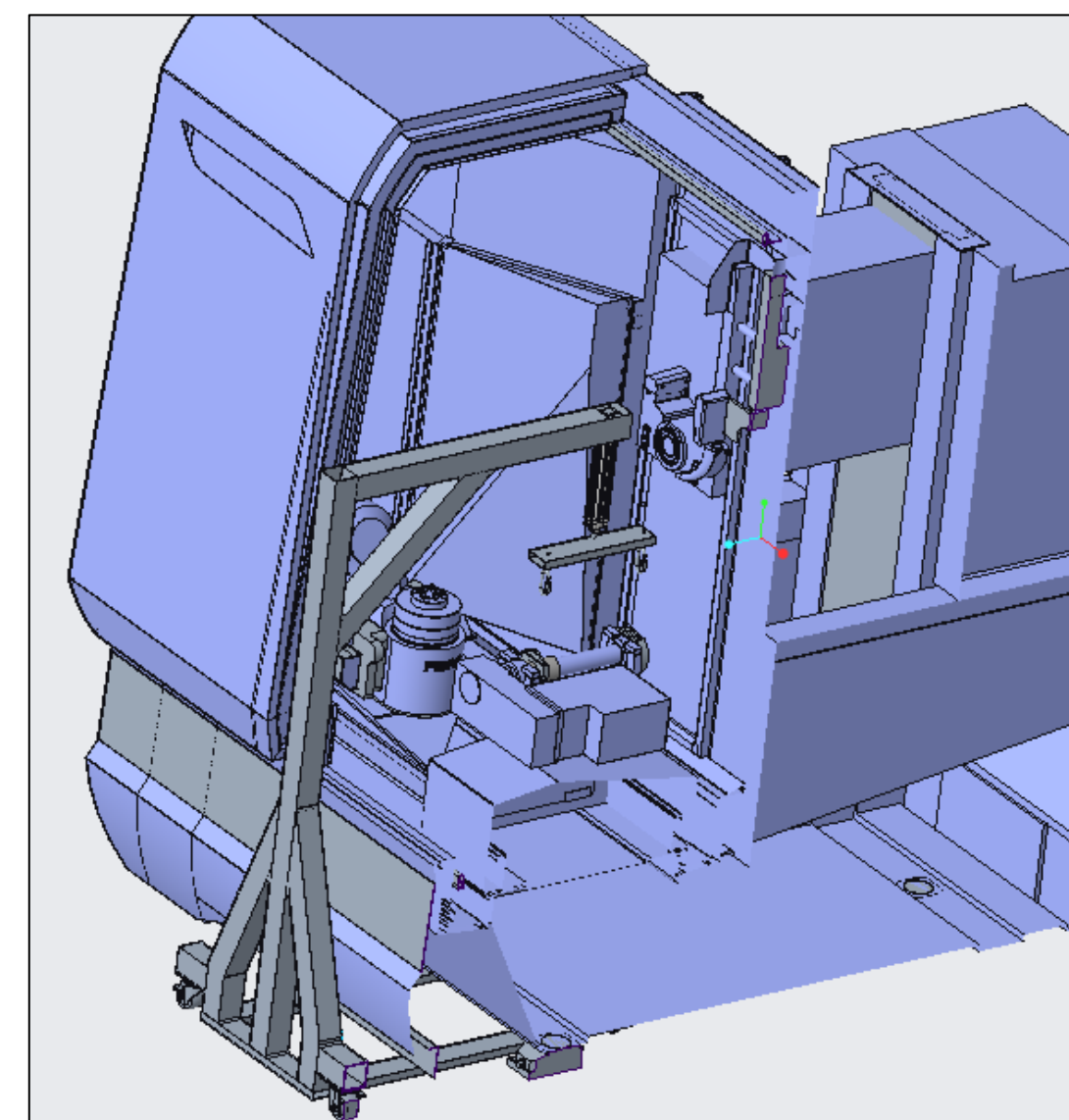


Figure 3.0. View of entire final design

## MECHANICAL FINAL DESIGN

**Hoist frame:** Modeled using 3"x3" and 3"x1" tubing. Shows casters and embedded wheels.

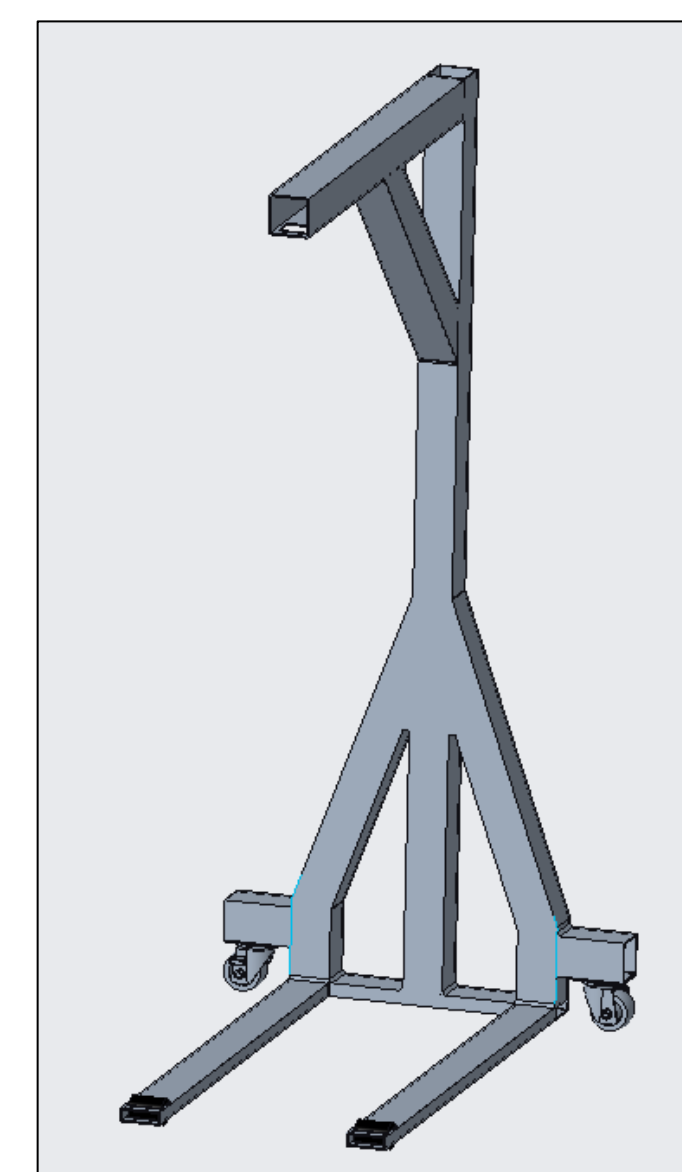


Figure 4.0. Front view of frame

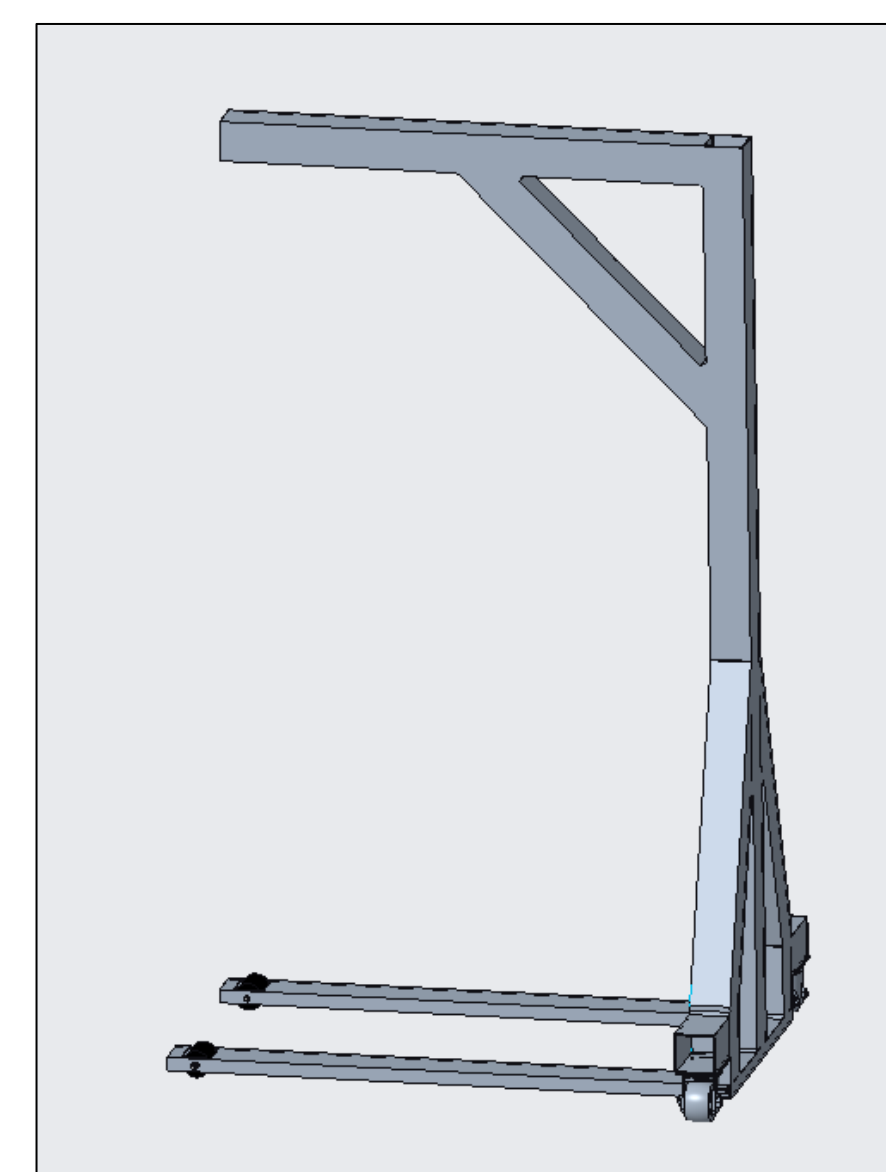


Figure 4.1. Side view of frame

**Grabbing Mechanism:** The grabbing assembly can be seen in Figures 5.0 - 5.2.

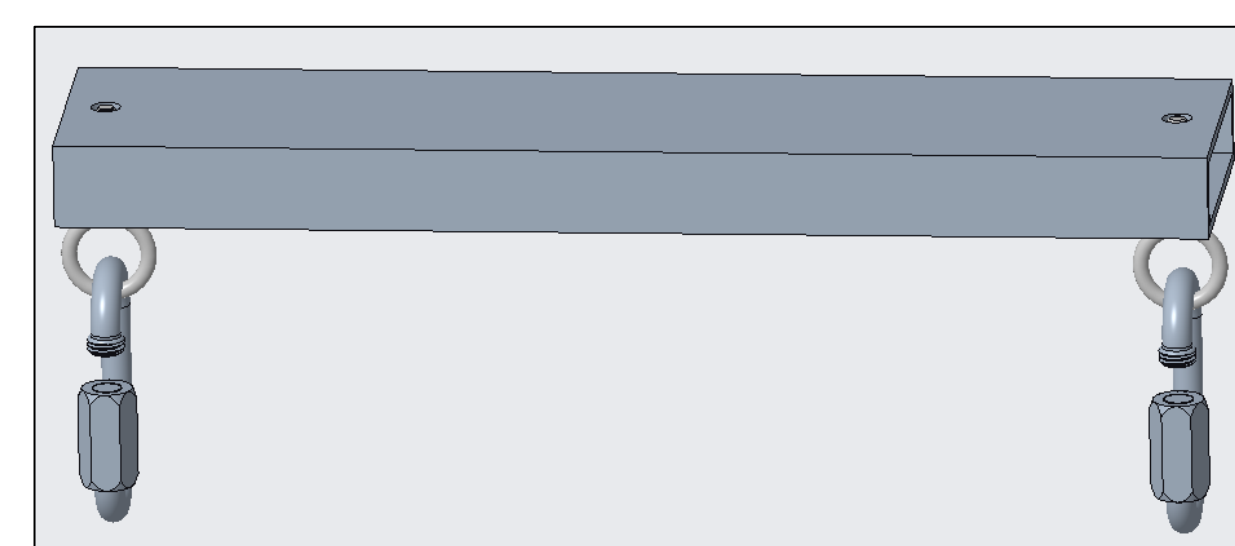


Figure 5.0. Model of spreader bar with eye hooks and clips installed

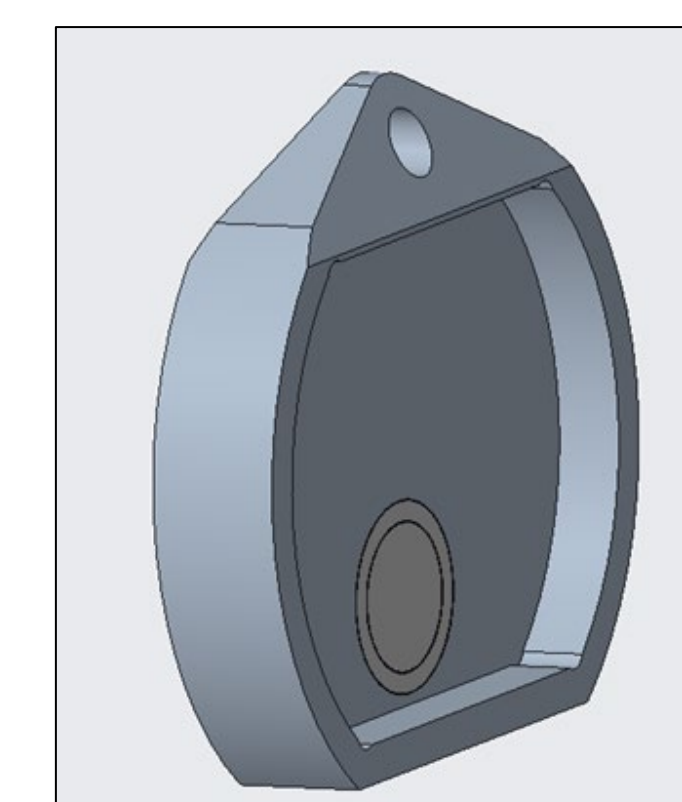


Figure 5.1. Model of backplate with cutout for magnet

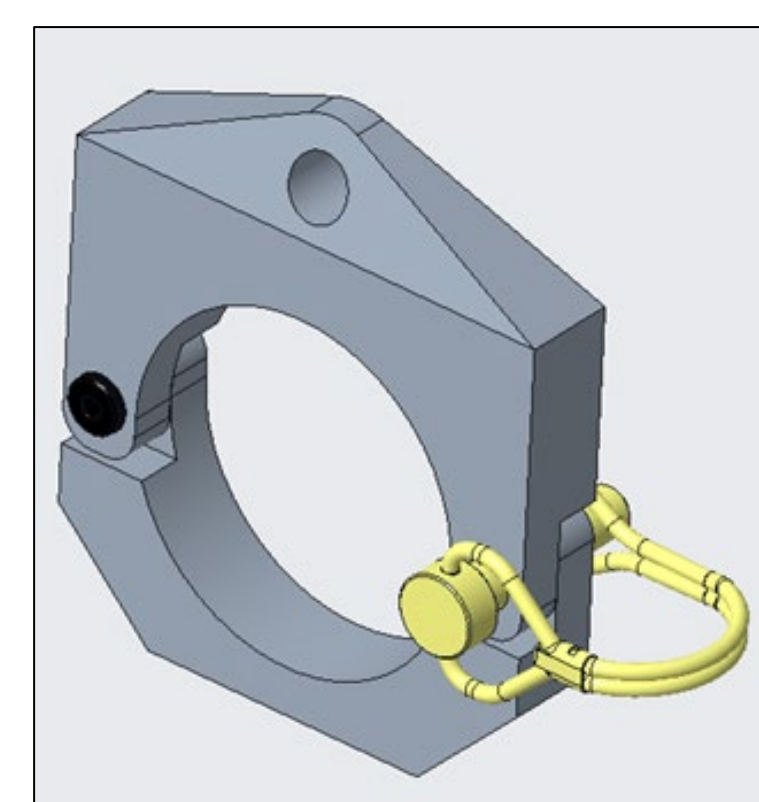


Figure 5.2. Model of locking collar with shoulder bolt and locking pin

## PNEUMATIC FINAL DESIGN

The final design of the pneumatic system with components can be seen in Figures 6.0 – 6.3.

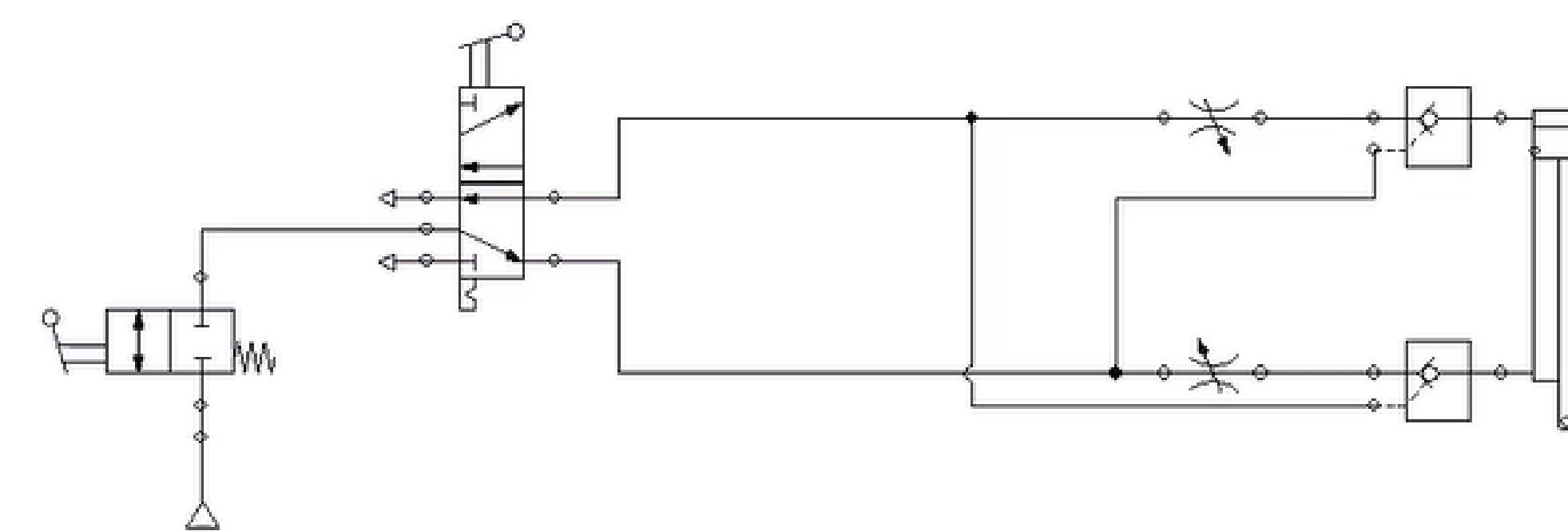


Figure 6.0. Schematic pneumatic layout

**Lifting Mechanism:** Pneumatic cylinder. All pneumatic components are not pictured

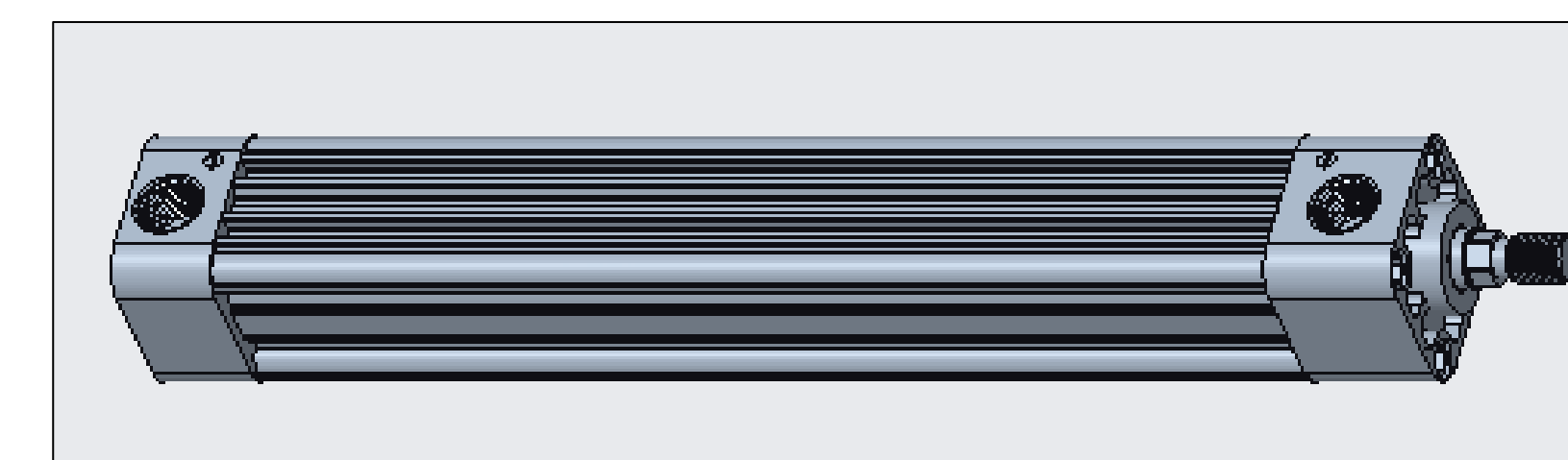


Figure 6.1. View of the pneumatic cylinder

**Pneumatic Components:** Pilot-operated check valve (Figure 6.2) used as safety fault system to trap air in cylinder. Flow control valves (Figure 6.3) used to decrease or increase the flow of air in the cylinder. Used to reduce or increase speed.

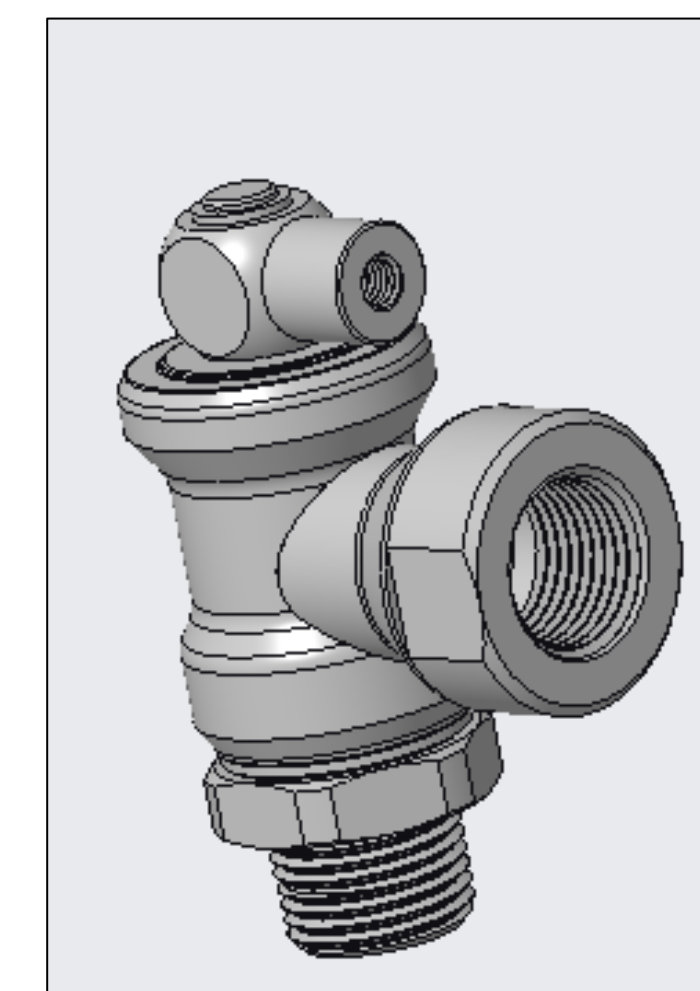


Figure 6.2. View of the PO Check Valve

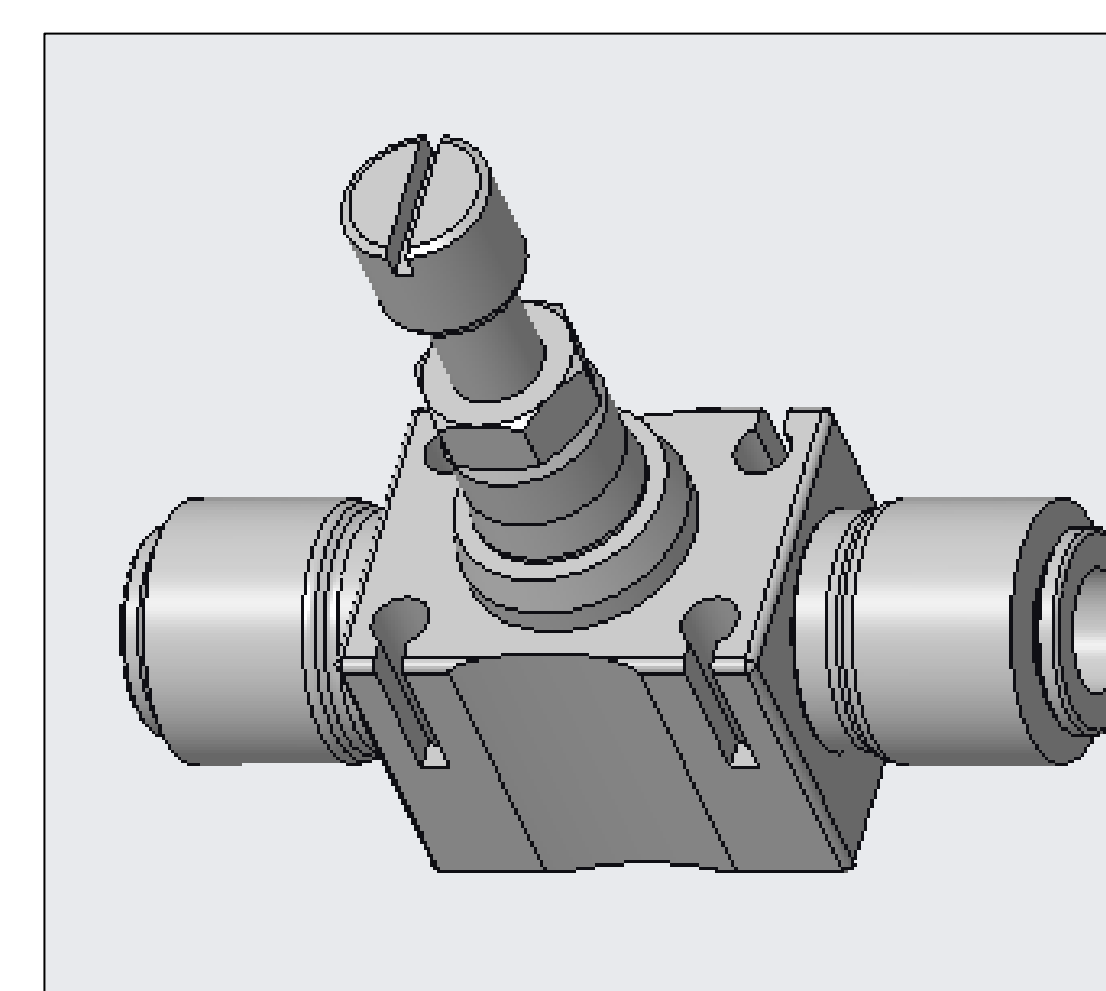


Figure 6.3. View of the Flow Control Valve

## RESULTS

The results of the capstone project can be seen in Figures 7.0 – 7.3.



Figure 7.0. Locking collar with pin



Figure 7.1. Backplate with magnet installed

## RESULTS CONTINUED

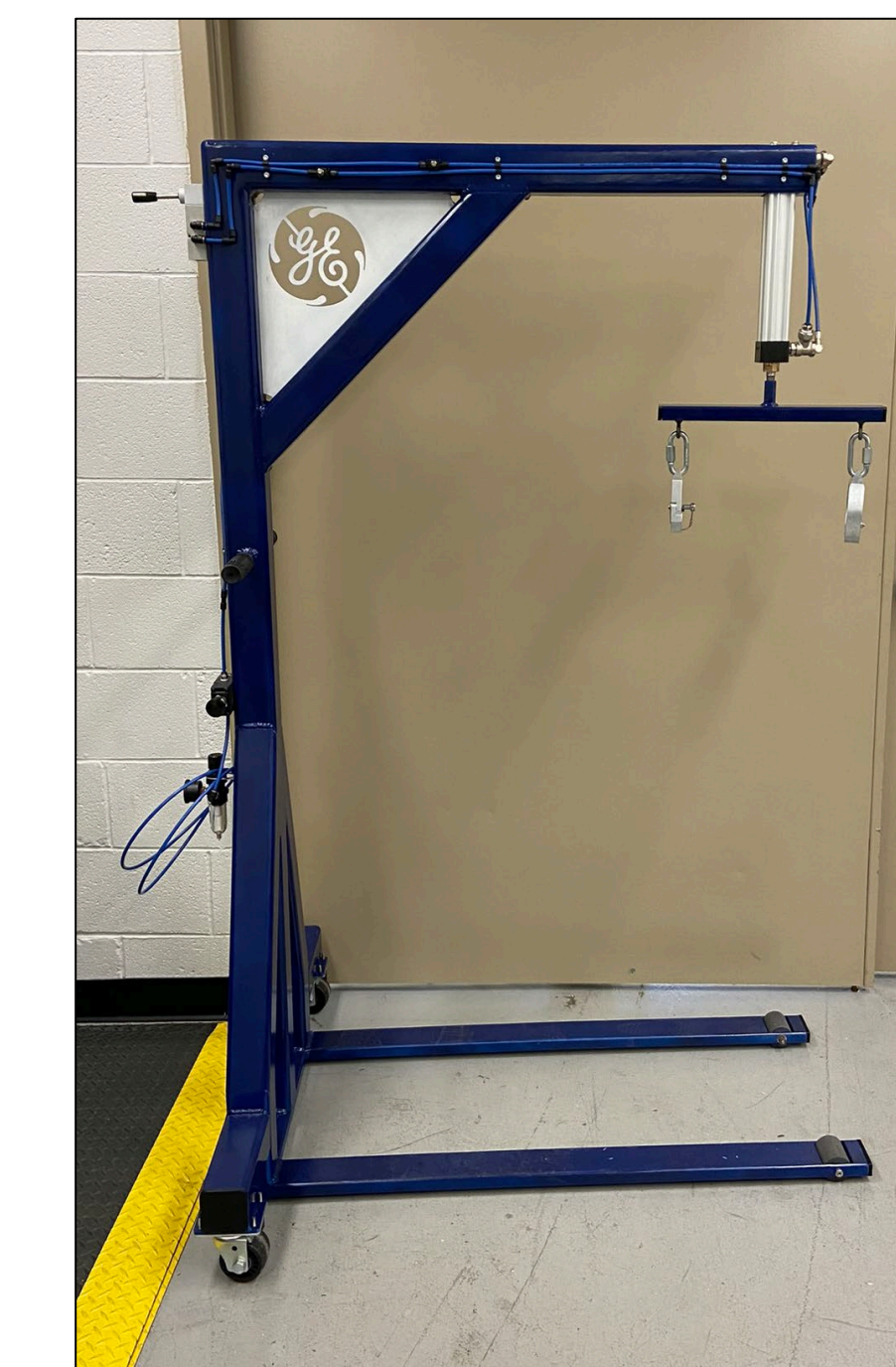


Figure 7.2. Side view of completed hoist



Figure 7.3. Rear view of hoist with pneumatic components

## SUMMARY AND CONCLUSIONS

A functioning hoist prototype was created and meets the requirements established by GE Aerospace. The hoist was created to reduce the dressing roll removal and installation time while being operable by a single operator.

- The hoist includes:
  - Casters with wheel brakes to ensure safety during removal and installation
  - Pneumatic system with safety features
  - Locking components to be used to lock dressing roll in place before lifting
  - Custom cut GE logo for extra pizzaz

## TEAM & ACKNOWLEDGEMENTS

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